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Research Article

New records of centipedes (Myriapoda: Chilopoda) in the fauna of Georgia, South Caucasus

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Abstract

Georgia's rich biodiversity, as a key part of the Caucasus hotspot, makes it an ideal destination for scientific research. Nevertheless, knowledge about the species diversity of different animal groups in this area remains limited. In this article we provide information on the nine centipede species (*Henia brevis* (Silvestri, 1896), *H. hirsuta* Verhoeff, 1928, *H. taurica* (Sseliwanoff, 1884), *Strigamia caucasia* (Verhoeff, 1938), *S. pusilla* (Sseliwanoff, 1884), *Harpolithobius spinipes* Folkmanová, 1958, *Lithobius antipai* Matic, 1969, *L. foviceps* Muralevitch, 1926, and *L. micropodus* (Matic, 1980)) newly recorded in Georgia. Three of these species (*H. brevis*, *H. hirsuta*, and *L. micropodus*) are also new records for the Caucasus region. Data on their distribution, maps of the localities, and photos of the specimens studied are also given.

Key words: Georgia, Caucasus, new records, Geophilomorpha, Lithobiomorpha

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Introduction

The biological diversity of Georgia is remarkable and fascinating. The country, like the entire Caucasus, has attracted the interest of many zoologists who have studied the fauna of this area over the last two centuries. However, a large part of Georgia's biodiversity still remains unexplored (Mumladze et al. 2020). In this study, we contribute nine new records to the centipede fauna of Georgia, namely: *Henia brevis* (Silvestri, 1896), *H. hirsuta* Verhoeff, 1928, *H. taurica* (Sseliwanoff, 1884), *Strigamia caucasia* (Verhoeff, 1938), *S. pusilla* (Sseliwanoff, 1884), *Harpolithobius spinipes* Folkmanová, 1958, *Lithobius antipai* Matic, 1969, *L. foviceps* Muralevitch, 1926, and *L. micropodus* (Matic, 1980). Three of them, *H. brevis*, *H. hirsuta*, and *Lithobius micropodus*, are reported for the first time for the entire Caucasus. To date, 57 species and two subspecies were known from Georgia (Kiria et al. 2023); however, with the synonymization of *Pleurogeophilus caucasicus* under *Clinopodes caucasicus*, the number of species is reduced to 56. Subsequently, the number of known centipede species has increased to 65.

Materials and methods

The centipede specimens were collected between 2010–2023 in different regions of Georgia (Figures 1-2). Specimens were extracted from sieved leaf litter and topsoil using a Winkler extractor or collected by hand, then stored in 96% pure ethanol and identified using compound (Accu-Scope-Exc-350) and stereo microscopes (Unitron Z650HR). The specimens are deposited in the collections of the Institute of Zoology at Ilia State University, Tbilisi, Georgia (ISUIZ). Images were taken with the same microscopes equipped with an Excelis AU-600HD camera and captured using Captavision 5.1 software. For species identification, we use Zalesskaja (1978) and the interactive key ChiloKey (Bonato et al. 2014). The classification and the currently valid names of the taxa follow Chilobase (Bonato et al. 2016). The scientific names of genera and species are arranged alphabetically.

The coordinates were recorded with Garmin GPSMAP 64s. The maps showing species distribution were created with QGIS (3.22.3).

Results

Order Geophilomorpha Pocock, 1895
Family Dignathodontidae Cook, 1896
Genus *Henia* C. L. Koch, 1847

1. *Henia brevis* (Silvestri, 1896)

Type locality. Italy: Oriolo, Voghera, originally described as *Chaetechelyne brevis* Silvestri, 1896.

Material examined. GEORGIA • 1♂; eastern Georgia, Mtskheta municipality, Saskhori limestone quarry, sifting site N6; N41.84655°, E44.50885°; 640 m a.s.l.; 6 Mar. 2022; leg. M. Gogshelidze, E. Maghradze, L. Shavadze; • 1♂; sifting site N4; N41.84402°, E44.52403°; 655 m a.s.l.; 19 Apr. 2022; leg. M. Gogshelidze, E. Maghradze, L. Shavadze, N. Modebadze.

Distribution. Europe: British Is., France, Germany, Italy, Moldova (Zapparoli and Iorio 2012), Czech Republic (Tuf and Tajovský 2016).

Remarks. *Henia brevis* was described by Silvestri (1896) from Italy. This is the first record of this species in Georgia and the Caucasus as well.

2. *Henia hirsuta* Verhoeff, 1928

Fig. 3

Type locality. Greece: Mesolongi.

Material examined. GEORGIA • 3♂; eastern Georgia, Lagodekhi municipality, Lagodekhi National Park, subalpine meadow; N41.87408°, E46.37877°; 2347 m a.s.l.; 3 Jun. 2013; leg. L. Mumladze; • 2♂, 1♀; Lagodekhi National Park; N41.85232°, E46.28744°; 652 m a.s.l.; 26 May 2023; leg. E. Kiria, M. Gogshelidze, L. Shavadze, A. Margalitadze; • 2♂; eastern Georgia, Tianeti municipality, village Bochorma; N41.92391°, E45.10189°; 965 m a.s.l.; 24 May 2017; leg. L. Mumladze.

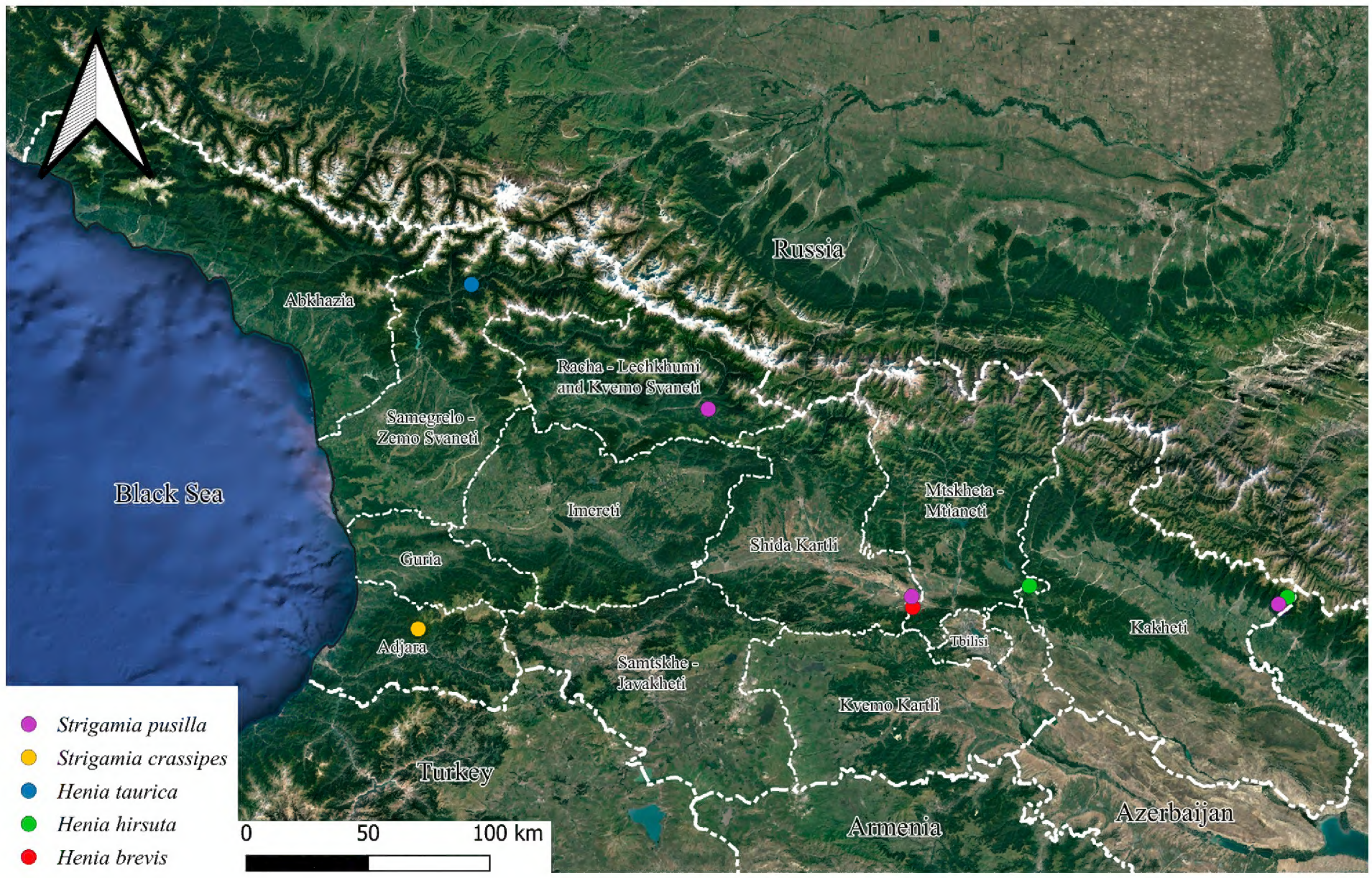

Figure 1. Distribution map of newly recorded Geophilomorpha in Georgia.

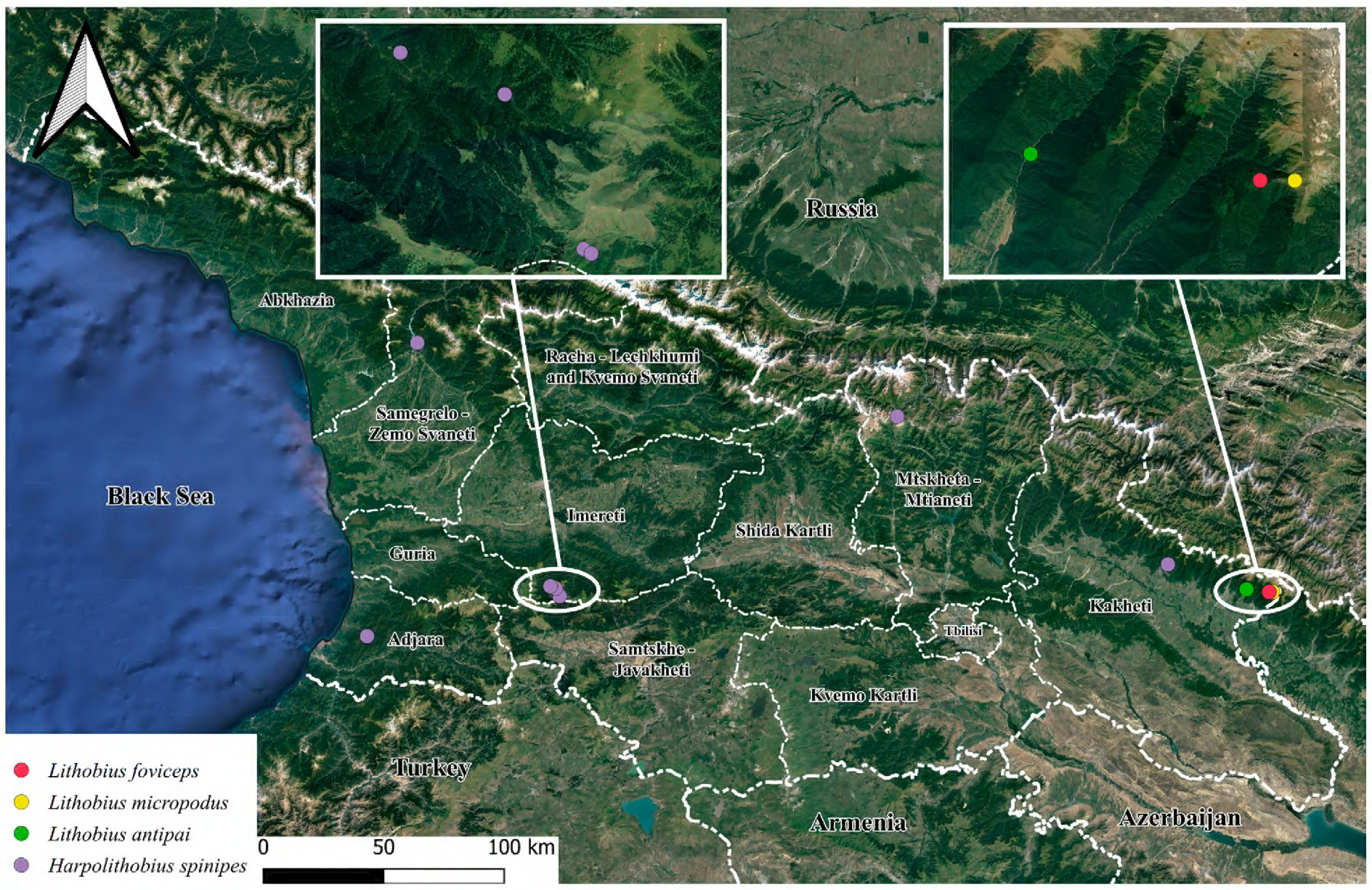

Figure 2. Distribution map of newly recorded Lithobiomorpha in Georgia.

Distribution. Greece (Verhoeff 1928, Kanellis 1959, Matic 1976).

Remarks. This species was described from a specimen found near Mesolongi, central Greece (Verhoeff 1928). This was the only information on its distribution until now. This is the first record of this species for Georgia and also for the entire Caucasus.

3. *Henia taurica* (Sseliwanoff, 1884)

Fig. 4

Type locality. Ukraine: Crimea, originally described as *Scotophilus tauricus* Sseliwanoff, 1884.

Material examined. GEORGIA • 1♂; western Georgia, Mestia municipality, village Dizi; N43.00778°, E42.29167°; 834 m a.s.l.; 27 Jun. 2015; leg. L. Mumladze.

Distribution. Ukraine: Crimea (Sseliwanoff 1884), Russia: Krasnodar (Korobushkin et al. 2016).

Remarks. This species was described by Seliwanoff (1884) on the basis of 19 specimens (10♂ and 9♀) from the Crimea and was initially known as an endemic species of the Crimea. It was later recorded in Krasnodar, Russia, mainly under the stones of deciduous forests (Korobushkin et al. 2016). This is the first record of this species for Georgia.

Family Linotaeniidae Cook, 1899
Genus *Strigamia* Gray, 1843

4. *Strigamia caucasia* (Verhoeff, 1938)

Type locality. Near Gora Abago, Krasnodar, Russia, originally described as *Scolipolanes* (*Protoplanes*) *caucasius* Verhoeff, 1938.

Material examined. GEORGIA • 1♀; western Georgia, Kobuleti municipality, Khino; N41.72792°, E42.08298°; 1022 m a.s.l.; 23 Aug. 2010; leg. L. Mumladze.

Distribution. Russia: Krasnodar (Verhoeff 1938)

Remarks. Originally, this species was described as *Scolipolanes caucasius*, and its taxonomic status was never questioned (Bonato et al. 2012). For a long time, this species was known only from a single locality in the western Caucasus, but recently larger material was collected from this region (Zuev 2016). This is the first record of this species for Georgia.

5. *Strigamia pusilla* (Sseliwanoff, 1884)

Type locality. Russia: Zarajsk, originally described as *Scolioplanes pusillus* Sseliwanoff, 1884.

Material examined. GEORGIA • 1♂, 1♀; eastern Georgia, Lagodekhi municipality, Lagodekhi National Park, mixed broadleaf forest; N41.84830°, E46.33423°; 1428 m a.s.l.; 3 Jun. 2013; leg. L. Mumladze.

Distribution. Czech Republic, Slovakia, Poland, Romania, Russia, Mongolia (Tuf and Kupka 2015).

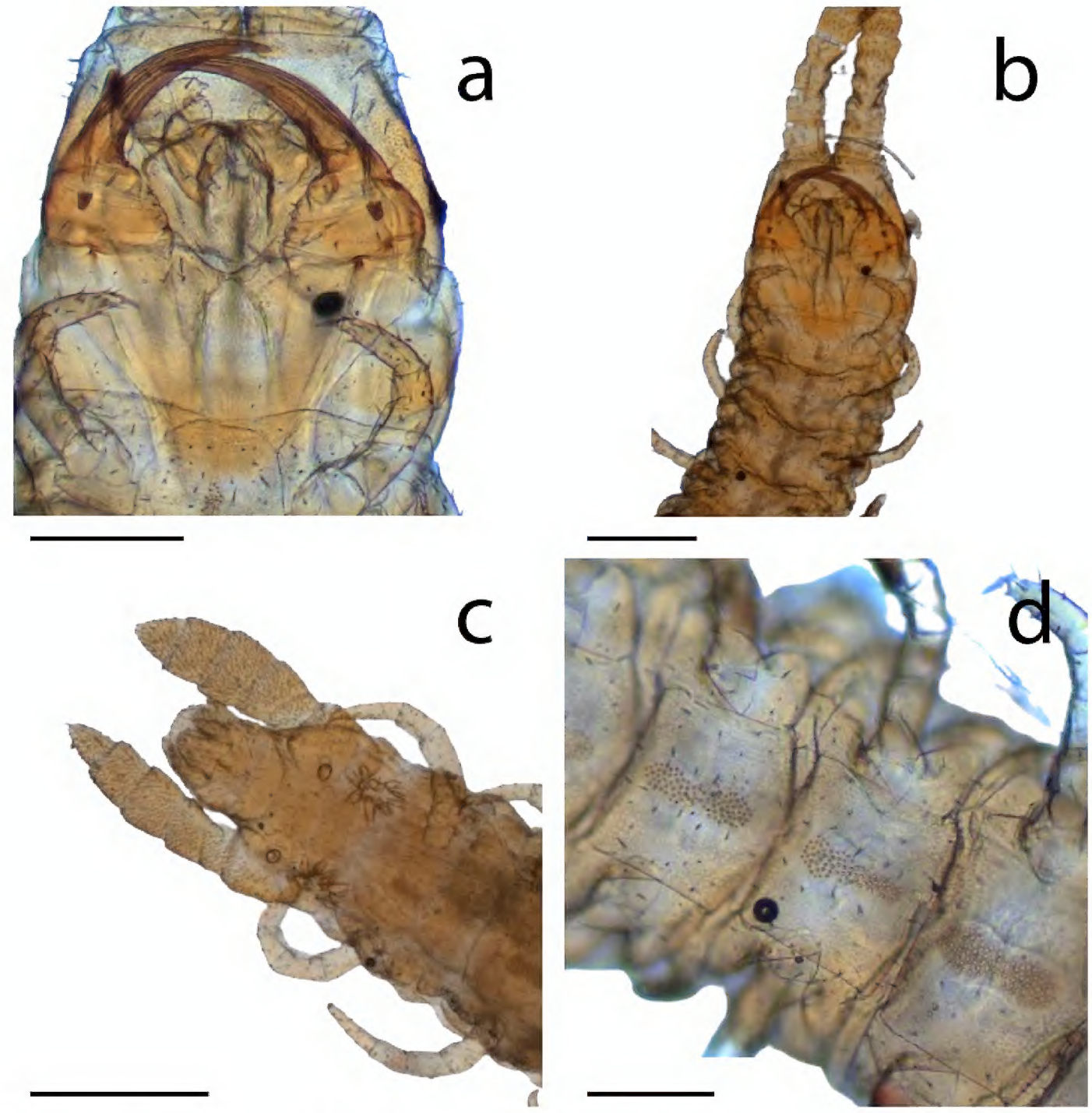

Figure 3. *Henia hirsuta* Verhoeff, 1928, male, (a) head ventral view; (b) head and first two anterior sternites, ventral view; (c) posterior segments, ventral view; (d) segments showing sternal pores, ventral view. Scale bars: 0.2 mm (a, d); 0.5 mm (b, c).

Remarks. *Strigamia pusilla* was described by Sseliwanoff (1884) based on 7♂ and 5♀ from Zarajsk, Russia. Here we presented the first record of this species for the territory of Georgia.

Order Lithobiomorpha Pocock, 1895
Family Lithobiidae Pocock, 1895
Genus *Harpolithobius* Verhoeff, 1904

6. *Harpolithobius spinipes* Folkmanová, 1958

Type locality. Russia: Krasnaya Polyana.

Material examined. GEORGIA • 1♂; eastern Georgia, Lagodekhi municipality, Lagodekhi protected areas, mixed broadleaf forest; N41.87438°, E46.36163°; 1970 m a.s.l.; 3 Jun. 2013; leg. L. Mumladze; • 1♂; western Georgia; Baghdati municipality, near Zekari Pass, subalpine forest; N41.84686°, E42.80745°; 2210 m a.s.l.; 11 Oct. 2013; leg. L. Mumladze; • 1♀; western Georgia; Baghdati municipality, near Zekari Pass, subalpine forest; N41.84609°, E42.80933°;

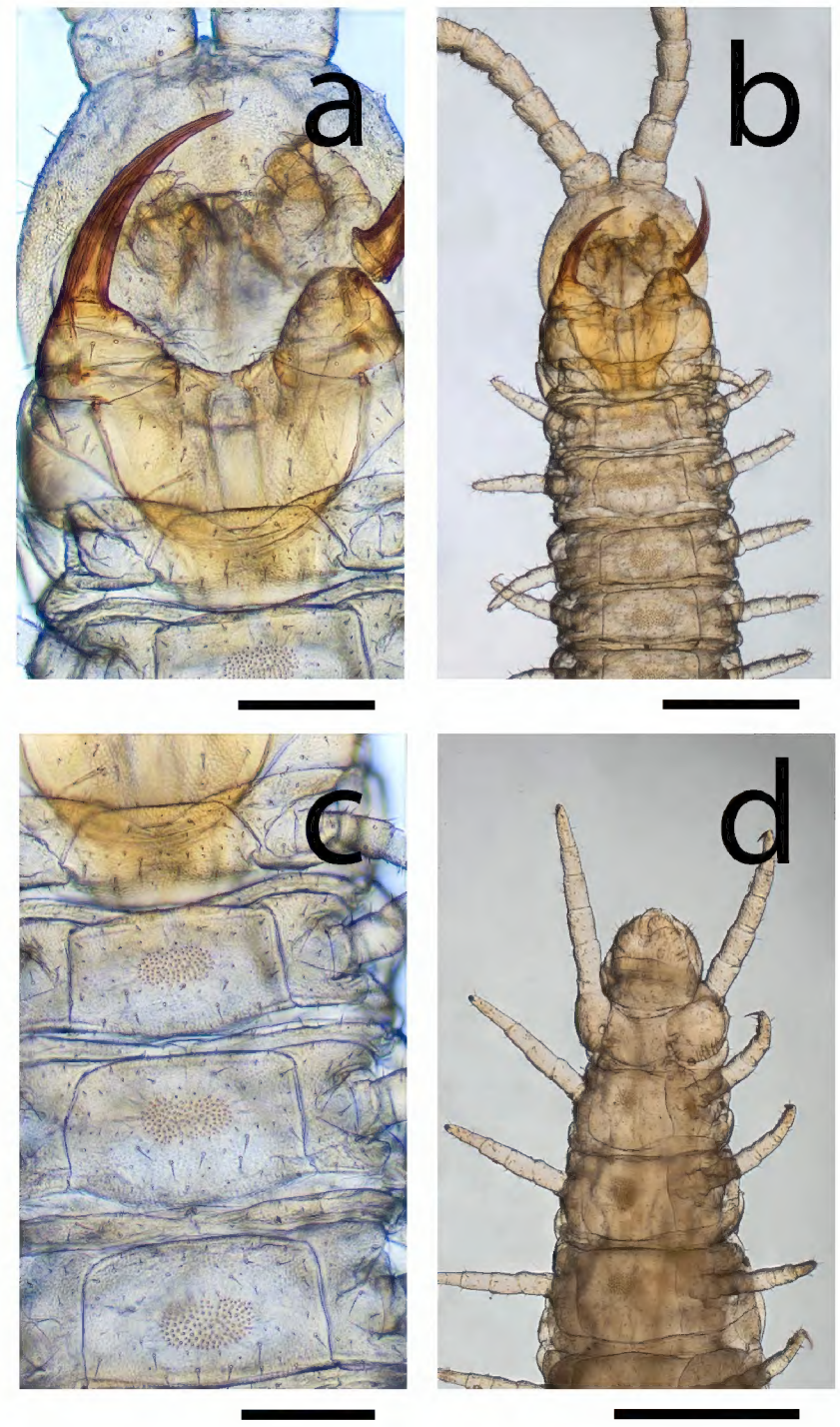

Figure 4. *Henia taurica* (Sseliwanoff, 1884), female, (a) head, ventral view; (b) head and first anterior sternites, ventral view; (c) segments showing sternal pores, ventral view; (d) posterior segments, ventral view. Scale bars: 0.1 mm (a); 0.5 mm (b, d); 0.2 mm (c).

2204 m a.s.l.; 11 Oct. 2013; leg. L. Mumladze; • 1 ♂; western Georgia; Baghdati municipality, Sairme Gorge; mixed forest; N41.87473°, E42.78721°; 1615 m a.s.l.; 11 Oct. 2013; leg. L. Mumladze; • 1♀; western Georgia; Baghdati municipality, Sairme Gorge; mixed forest; N41.88185°, E42.76146°; 1439 m a.s.l.; 11 Oct. 2013; leg. L. Mumladze; • 1♂; western Georgia, Kobuleti municipality, Mtirala mountain, Colchic humid forest; N41.67383°, E41.85428°; 450 m a.s.l.; 25 Mar. 2014; leg. L. Mumladze; • 1♀; western Georgia, Tsalenjikha municipality, village Potskho Etseri; Zugdidi-Mestia roadside, under the rocks; N42.77657°, E42.05402°; 716 m a.s.l.; 27 Jun. 2015; leg. L. Mumladze; • 1♂; eastern Georgia, Stepantsminda municipality, village Kobi, Subalpine meadow, steep slope with boulders; N42.53774°, E44.49272°; 2280 m a.s.l.; 19 Aug. 2017; leg. L. Mumladze; • 1♂; eastern Georgia, Kvareli municipality, forest floor with large stones; N41.98228°, E45.85405°; 835 m a.s.l.; 5 Oct. 2021; leg. L. Mumladze.

Distribution. Russia (Folkmanová 1958; Korobushkin et al. 2016).

Remarks. This species is only known from the Caucasus. For a long time, only two localities were known from Russia until the study by Korobushkin et al. (2016) included new records from Krasnodar. We have added several

new localities to the distribution of *H. spinipes*. This is the first record of this species for Georgia.

Genus *Lithobius* Leach, 1814

7. *Lithobius antipai* Matic, 1969

Fig. 5

Type locality. Iran: Mountain Demavend.

Material examined. GEORGIA • 2♀; western Georgia; Lagodekhi municipality, Lagodekhi protected areas, broadleaf forest; N41.88541°, E46.24866°; 740 m a.s.l.; 27 May 2023; leg. E. Kiria, M. Gogshelidze, L. Shavadze, A. Margalitadze; • 1♂; western Georgia; Lagodekhi municipality, Lagodekhi protected areas, broadleaf forest; N41.88695°, E46.25825°; 1058 m a.s.l.; 27 May 2023; leg. E. Kiria, M. Gogshelidze, L. Shavadze, A. Margalitadze; • 3♂; western Georgia; Lagodekhi municipality, Lagodekhi protected areas, broadleaf forest, location N2; N41.88386°, E46.25681°; 995 m a.s.l.; 27 May 2023; leg. E. Kiria, M.Gogshelidze, L. Shavadze, A. Margalitadze.

Distribution. Azerbaijan (Zalesskaja 1978), Russia, Iran (Matic 1969), Azerbaijan, Iran (Dyachkov et al. 2023).

Remarks. The original description of this species by Matic (1969) included two localities from Russia and Iran. Afterward, Zalesskaja (1978) added a new locality from Azerbaijan. Subsequently, nothing was known about this species until Dyachkov et al. (2023) reported additional new locality from Iran. Our report on this species is the first record in Georgia.

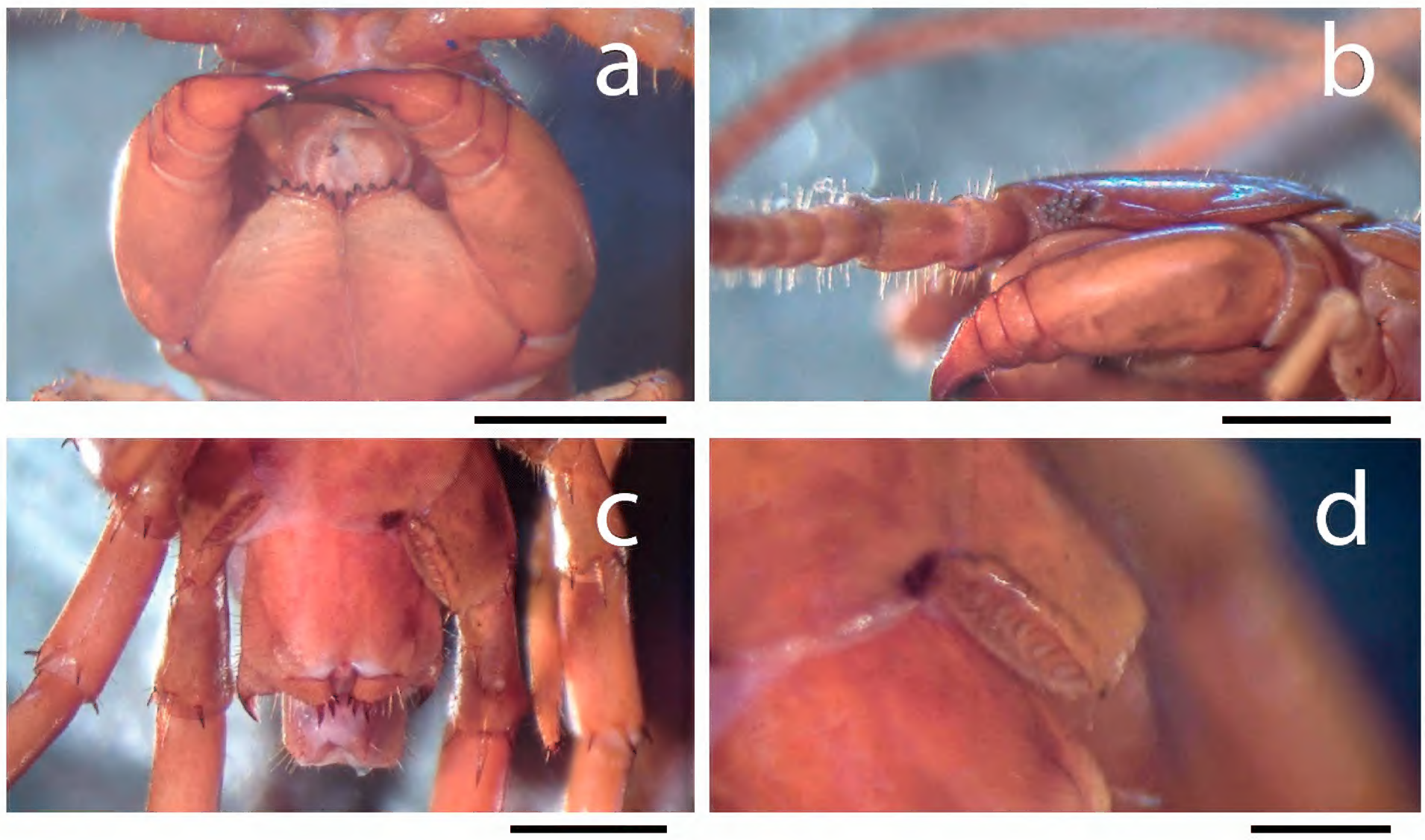

Figure 5. *Lithobius antipai* Matic, 1969, female, (a) head, ventral view; (b) head, lateral view; (c) genital segments, ventral view; (d) left coxa 15, ventral view. Scale bars: 1 mm (a, b, c); 0.5 mm (d).

8. *Lithobius foviceps* Muralevitch, 1926
Fig. 6

Type locality. Azerbaijan: Kemervan.

Material examined. GEORGIA • 1♀; Lagodekhi municipality, Lagodekhi protected areas, mixed broadleaf forest; N41.87438° E46.36163°; 1970 m a.s.l.; 3 Jun. 2013; leg. L.Mumladze.

Distribution. Azerbaijan: Kemervan (Muralevitch 1926, Dyachkov 2024).

Remarks. Until now, this species was known only from its type locality, which is only ca 150 km from Lagodekhi. We have recorded this species for the first time in Georgia.

9. *Lithobius micropodus* (Matic, 1980)

Type locality. Type locality is unknown. Matic (1980) proposed this nomen novum for *Lithobius microps* Auctorum, non Meinert, 1868, when synonymized Meinert´s species with *L. duboscqui* Brölleman, 1884. Original combination as *Monotarsobius micropodus* Matic, 1980.

Material examined. GEORGIA • 2♂; Lagodekhi municipality, Lagodekhi protected areas, subalpine meadow; N41.87408°, E46.37877°; 2347 m a.s.l.; 3 June 2013; leg. L. Mumladze.

Distribution. Mainland and insular Greece, Albania, Bosnia Herzegovina, Croatia, France, Italy, Montenegro, Romania, Russian Plain, Sardinia, Serbia, Sicily, Slovenia, Turkey (Zapparoli 2002 as cited in Simaiakis et al. 2004), Bulgaria (Bachvarova 2011), Czech Republic (Tuf and Tajovský 2016).

Remarks. This species is widely known in Europe but has never been recorded from the Caucasus. This is the first record for Georgia and also for the entire Caucasus.

Discussion

A recently published checklist of Georgian centipedes lists 59 (sub)species based on a thorough review of all literature sources. However, this list contains minor inaccuracies (Kiria et al. 2023).

1. *Lithobius piceus* L. Koch, 1862, is included in the checklist based on the mention of the occurrence of the subspecies *L. piceus caucasica* Murale-

Figures 6. *Lithobius foviceps* Muralevitch, 1926, female, (a) head, ventral view; (b) head, lateral view; (c) genital segments, ventral view. Scale bars: 1 mm (a, b); 0.5 mm (c).

witch, 1926, which was synonymized with this species by Matic and Darabantu (1968). However, a more recent paper by Golovatch et al. (2022) states that the subspecies *L. piceus caucasica* was synonymized with *Hessebius megapus* (Muralevitch, 1907). This information is not found in the cited article and is therefore probably a misstatement, thus the presence of *L. piceus* in Georgia is reported correctly.

2. *Pleurogeophilus caucasicus* Folkmanová, 1958 is incorrectly included in the checklist. According to Bonato et al. (2011), it is a junior synonym of *Clinopodes caucasicus* (Sseliwanoff, 1884), which is already known from several Georgian localities and has recently been included in the checklist of Azerbaijan centipedes (Dyachkov 2024).
3. For *Strigamia* cf. *S. transsilvanica* (Verhoeff, 1928), other possible occurrences in Asia were intentionally omitted. Although some, perhaps the same species similar to *Strigamia transsilvanica*, are repeatedly reported in several localities much further east (e.g., Nefediev et al. 2018, Dyachkov 2018). However, theoretically there may be several similar species morphologically close to *S. transsilvanica*, and the occurrence of a single species over such a large area is not very likely (Daychkov and Bonato 2024).
4. *Lamyctes coeculus* (Brölemann, 1889) was listed as doubtful, because it was not clear where the information mentioned in Nefediev et al. (2016) came from. The occurrence of this species in Georgia was listed in Fauna Europaea according to information obtained from Pavel Nefediev, which was properly cited in his paper. However, the database Fauna Europaea contained many errors and has not been available for a long time. Therefore, it cannot be verified whether it is the country of Georgia in the Caucasus or the state of Georgia in the USA, although both possibilities are likely for this greenhouse species.

Thus, if the previous checklist documented 56 valid species and two subspecies from Georgia, the presented study extends the list of recorded species to 65 species and two subspecies. However, even though this number is probably not definitive, it can be assumed that even more species occur in this biodiversity-rich country.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Author contributions

LM and EK collected material; EK and IHT identified species; EK drafted the original version of the manuscript. SB and LM provided logistical support. All authors contributed to the final version of the manuscript.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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